and eastern bays of Icefjord. In the Klaas Billen district valuable seams have been opened up at various heights. Varying from a few inches to about 3 ft. in thickness, they total 6 ft. Early analyses of Carboniferous coal were vitiated by the samples being taken from weathered slip masses, in consequence of which they showed a high proportion of ash. Now, however, that the coal has been reached *in situ*, it proves to be of high quality, clean and lustrous, and, unlike the Tertiary coal, fit for coking. Projects are on foot for extensive mining operations in these fields.

Jurassic coal is widely spread, but less accessible than the other kinds. It was the first coal to be mined, but turned out to be of relatively poor quality, and is now no longer worked.

Mining is continued throughout the year, although the export season at present extends only from June to September. The miners winter in comfortable timber houses, and are well supplied with fresh food, brought from the European mainland in the autumn. There is wireless communication throughout the winter. The restriction of export to four months in the year necessitates good storage facilities for the winter coal and rapid loading in summer both from the dump and direct from the mine, but these problems are being satisfactorily solved. The total coal export of Spitsbergen, which in 1913 was 35,000 tons, rose last year to 65,000 tons, and this year must have reached about 100,000 tons. These figures are, of course, comparatively small, but they will be much increased as several new mines get into working order. The shortage of labour, material, and tonnage still affected the output this season, but it may be said that the prejudice against mining in the Arctic has now been overcome, and Spitsbergen will soon take its due place as one of the important coal-producing countries of Europe.

R. N. R. B.

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## *NOTES.*

The Ministry of Munitions has published as a confidential document a highly interesting report of the Commission appointed to visit the iron and steel works of the occupied areas of Germany, also of Lorraine, Luxemburg, and certain portions of Belgium and France. The object of the Commission was to ascertain what developments in iron and steel manufacture have taken place during the war, the present condition of the plants, the future prospects of these areas, and to what extent fuel economy has been advanced therein. As regards the last-named item, Messrs. Cosmo Johns and Lawrence Ennis communicated to the recent autumn meeting of the Iron and Steel Institute a report on the present status of fuel economy in the German iron and steel industry of the occupied territory. This report is now public property, and contains very much interesting material; it may be taken as an indication of the importance of the valuable information which the Commission itself has collected. It is to be hoped that the Ministry of Munitions will see its way to publish the entire report as an ordinary Government publication purchasable in the usual way, so that it may be known by all engaged in the iron and steel industries in this country, as there is no reason why our industries should not be allowed the benefit of the careful studies of this Commission. Such an important document should be made available as widely as possible to all those interested in the subject-matter.

The future of the Royal Botanic Society at Regent's Park has for long been a matter of anxiety, and the recent appointment by Lord Ernle, when President of the Board of Agriculture and Fisheries, of a strong Committee to inquire and report as to what steps should be taken to render the work of the society as useful as possible, from the scientific and educational points of view, was a most welcome step. The Committee, under the chairmanship of Sir David Prain, Director of Kew Gardens, has taken evidence from representative botanists and others, and its report is now available. Apart from the establishment of the gardens at Regent's Park, the primary object of the society, which was incorporated in 1839, was "the promotion of botany and its application to medicine, arts, and manufactures." It is interesting and satisfactory, therefore, to note that the Committee is of the opinion that the usefulness of the work of the society would be enhanced by the organisation and development of botanical work essentially economic in its bearing. The chief suggestions made by the Committee are:—(1) The establishment of a school of economic botany at which a knowledge of economic plants and their products could be obtained; (2) an institute which might be made a centre for research, especially in plant physiology; and (3) a centre for teaching practical horticulture. The first is the most notable and valuable recommendation. The establishment of such a school would supply an undoubted want in this country, where organised instruction in economic botany, especially as regards tropical crop plants, is almost impossible to obtain. The Committee is to be congratulated on so accurately judging the need of the situation. It is greatly to be hoped that the financial means necessary for the successful carrying out of the Committee's recommendations will be forthcoming.

A meeting of the Executive Committee of the United States National Research Council was held at the National Research Council Building, Washington, on April 15 last, and according to an abstract, 21 pages in length, of the minutes, which appears in the July issue of the Proceedings of the National Academy of Sciences, the Council has already made great progress in initiating and co-ordinating research in pure and applied science in the States. It has organised divisions for physical science, chemical science, geology and geography, biology and agriculture, engineering, industrial, educational, and State relations. Each division is presided over by a man of note, and on it there are many representatives of scientific and other societies. The Council will have ample funds at its disposal, the Rockefeller Foundation alone having undertaken to provide 100,000*l.* during the next five years for the promotion of fundamental researches in physics and chemistry primarily in educational institutions. The chairman of the Council receives 2000*l.*, and chairmen of divisions 1500*l.*, per annum, with travelling expenses. The Council is to be congratulated on the speed with which it has accomplished so much.

Dr. Theodore W. Richards, professor of chemistry at Harvard University, has (*Science* announces) been elected president of the American Academy of Arts and Sciences.

THE Secretary of the Department of Scientific and Industrial Research informs us that a British Association of Research for the Cocoa, Chocolate, Sugar, Confectionery, and Jam Trades has been formed in accordance with the Government scheme for the encouragement of industrial research. The secretary is Mr. R. M. Leonard, the Manufacturing Confectioners' Alliance, Ltd., 9 Queen Street Place, E.C.4.

A COMMITTEE has been formed to raise a fund by public subscription for the purpose of establishing a memorial to perpetuate the memory of the eminent services, particularly in the fields of economics and science, rendered to Tasmania by the late Mr. R. M. Johnston, for many years Government Statistician and Registrar-General of that State. Subscriptions are now invited, and should be sent to Mr. T. A. Tabart, jun., honorary treasurer, Cathedral Chambers, Murray Street, Hobart, or Mr. Clive Lord, honorary secretary, c/o Museum, Macquarie Street, Hobart.

BY the untimely death of Prof. F. J. Haverfield, Camden professor of ancient history, the University of Oxford has lost a valued member and the first living authority on Roman Britain. Early in life Prof. Haverfield devoted himself to this, his special subject, and his reputation caused Mommsen to entrust to him that portion of the "Corpus Inscriptionum" which dealt with Great Britain. Not only was he a master of the literature of the Romano-British period, but he gave much assistance to excavations at Silchester, Caerwent, and the Roman Wall. He was an admirably stimulating lecturer, and was interested in town-planning in ancient times, on which he wrote a valuable book. Late in life he devoted himself to the question of university finance. It may be said that the Camden chair was never more worthily held by a scholar and practical archæologist. It is a matter of deep regret that ill-health prevented Prof. Haverfield from preparing the authoritative work on Roman Britain which he had planned, and alone could have accomplished.

WITH the mathematician Philip Edward Bertrand Jourdain there died on October 1 a truly remarkable character. Jourdain lived only thirty-nine years, but the amount and value of the work that he accomplished, considering the disabilities under which he laboured, are almost incredible. He was weakly from infancy, and as a child developed symptoms of the progressive paralytic condition known as Friedreich's ataxia. In spite of his unsteady gait and constant ill-health, he early showed great mathematical and mechanical capacity. He went up to Cambridge in 1898, then already a cripple. During his course at Cambridge he spent some time in Germany and became a fluent and scholarly linguist, speaking and reading several European languages. In 1904, though now physically quite incapacitated, he was awarded the Allen mathematical scholarship for research, and throughout the remainder of his short career his main activities were directed to the prosecution of mathematical investigations. His most important work was the discovery of certain series of infinite numbers. Working with Russell and Whitehead, he showed that certain arithmetical processes could be applied to them, and thus he obtained new and interesting results. He continued on this line of research, and even a few days before his death, of the imminence of which he was fully aware, he succeeded in demonstrating the existence of a previously unsuspected series of infinites. His very last work was the discovery of a formula for the well-ordering of *any* aggregate. Notes of this work are now, we understand, in the hands of Prof. Love. Jourdain contributed extensive mathematical articles to the last edition of the "Encyclopædia Britannica." He founded and edited the *International Journal of Ethics*. He was for some years the English editor, and since the death of Carus in 1918 the chief editor, of the *Monist*. He also made a number of translations of scientific works for the Open Court Publishing Co. Jourdain took the liveliest interest in the movement for encouraging the history of science. He was a contributor to *Isis*, and at the time of his death he had in preparation an article for the "Studies in the History and Method of Science" which it is hoped he may have left in a state ready for publication.

IN *Man* for September Col. de Guérin, of Guernsey, expresses the opinion that the megaliths in that island may be much more recent than they were hitherto supposed to be. This view is based on the important discovery of traces of a rudely sculptured human figure on a capstone of the great chamber of the dolmen of Déhus. The relationship of this figure to similar anthropomorphic sculptures in Guernsey and France is obvious, and as these latter, according to Déchellete and others, date at earliest from late in the Neolithic, at the verge of the Æneolithic period, the dolmen of Déhus must be of this age or later. This is confirmed by the discovery in 1847 of a copper knife-dagger in the great chamber of this dolmen. Col. de Guérin fixes also the statue Menhir at the Câtel Guernsey in the first Bronze age. He lays special stress on the evidence of a still earlier seaborne trade with Brittany in the numerous celts of jadeite and other foreign rocks found in the island.

IN the nineteenth volume of *Natural History* (Nos. 4–5, April–May, 1919) Mr. I. M. Clarke describes, with numerous excellent photographs, the new Gaspé bird sanctuaries established by the Canadian Government on Percé Rock and Bonaventure Island, off the Gaspé Peninsula, and, further out in the Gulf of St. Lawrence, the Bird Rocks of the Magdalen Islands. The efforts of ornithologists for bird-protection have at last proved successful with the support of the Hon. Honoré Mercier, Minister of Colonisation, Mines, and Fisheries for the Province of Quebec. In another article on the same subject Mr. A. M. Bailey describes the Hawaiian Island Reservation, which was established in 1909 by Executive Order as a sanctuary for the millions of sea-birds and waders which return there annually to raise their young or to rest while migrating. For this and other generous measures to preserve bird-life, science is indebted to the late Theodore Roosevelt.

*Natural History* (vol. xix., Nos. 4–5, April–May, 1919) publishes a series of articles on zoological sculpture in art and architecture. Mr. S. B. P. Trowbridge, dealing with architecture, beginning with the palæolithic horse frieze at Cap-Blanc and the horse painting from Altamira, reproduces photographs of the bas-reliefs of Assyria in the British Museum and the Rostra at Rome. In regard to modern art, he accounts for the comparative failure of modern attempts on the ground that "in the art of sculpture, as in all art, there must be sincerity and truth, accuracy in delineation and fidelity in modelling, and the suppression of every detail unnecessary to expression." This idea is pursued in Mr. C. R. Knight's account of the work of contemporary American artists dealing with animal life. The black rhinoceros and African buffalo by Mr. J. L. Clark have some impressive vigour; but the zoological statuary at Washington, described by Mr. R. W. Shufeldt, shows little dignity or power of expression.

The lions, tigers, and buffaloes are distinctly inferior to the Nineveh hunting scenes described in the previous article.

MR. V. STEFANSSON describes his successful method of Arctic exploration in an interesting article entitled "Living Off the Country" in the May issue of the *Geographical Review* (vol. vii., No. 5). Mr. Stefansson's well-known adoption of Eskimo habits and diet have enabled him to travel with very light loads and to penetrate far into the unknown for long periods without any anxiety. He contends that from experience he has found that a diet of flesh or fish is quite sufficient to sustain a person in good physical and mental condition, and that salt is not necessary for health. White men whom he has known to have lived for a year or more on an exclusive meat diet have shown no desire to return to the varied and elaborate diet of civilisation. So convinced is Mr. Stefansson of the abundance of food in the Arctic lands and seas he knows that he asserts that any man conversant with the ways of wild animals and the hunting and living methods of the Eskimo can load on one dog-team all the equipment he needs for a journey of several years. Where previous explorers had carried food and fuel, Mr. Stefansson carried neither, choosing to adapt himself to his environment rather than fight it. Instead of taking food and fuel he carried merely the instruments for obtaining them. By economy in the use of ammunition one can obtain as much as two tons of food for a pound of ammunition, or, in other words, ammunition is several thousand times as economical to carry as the most condensed kind of food. The paper deals at length with the methods of Arctic hunting, particularly seal-stalking.

IN his presidential address to the seventeenth meeting of the South African Association for the Advancement of Science, held in July last, the Rev. Dr. W. Flint discussed the thorny problem of "Race Consciousness" in the light of modern scientific opinion. He regarded "national consciousness" as a mental tendency which had been fostered among the peoples of Europe, by territorial and linguistic boundaries, and by the propagation of a community of ideas. "Race consciousness," as seen in South Africa and in the Southern States of America, on the other hand, was an inherent proclivity or "property of human nature," and demanded the closest scrutiny and most accurate study on behalf of all men of science if political bankruptcy was to be avoided. In Spanish America racial animosities had been dissolved by miscegenation, but that method was unthinkable as a solution of South African racial difficulties. There was also another plan, the proposal to segregate native races in demarcated territories, but in practice that proved an impossible working policy. There was a third proposal which had been debated, the frank recognition of racial antagonism and the resolution on the part of each race to live within its own armed camp. The solution advocated by Dr. Flint was none of these, but the cultivation and recognition of an "international consciousness," which could be fostered by education and by the recognition on the part of "superior" peoples that every race has its rights, economical, political, and social. Dr. Flint holds that "racial consciousness" can be uprooted and replaced by an intellectual "inter-racial consciousness," and that racial conflicts can be avoided only by education—of whites as well as of blacks. On the biological significance of "race consciousness" Dr. Flint did not attempt to throw any light; that is a matter which still awaits patient investigation. Everyone interested in the problems of racial contact will find food for thought and subjects for observation in Dr. Flint's presidential address.

THE Board of Agriculture has received the following information from the International Agricultural Institute at Rome:—The yield of wheat in Spain, Scotland, Italy, Canada, the United States, India, Japan, and Tunis is estimated at 929,525,000 cwt., or 5·6 per cent. below the 1918 crop, and 1·1 per cent. below the average yield of the five years 1913–17. The estimated production of rye for Italy, Canada, and the United States is given as 48,274,000 cwt., or 7·1 per cent. below last year's production, but 67·3 per cent. above the average crop for the years 1913–17. The barley crop for Scotland, Italy, Canada, the United States, Japan, and Tunis is estimated at 159,397,000 cwt., or 15·1 per cent. below last year's production, and 4·1 per cent. above the average production of the years 1913–17. The estimated production of oats in Scotland, Italy, Canada, the United States, Japan, and Tunis is 491,933,000 cwt., or 18·4 per cent. below the 1918 yield, and 7·2 per cent. below the average yield of the five years 1913–17. The maize crop in Italy, Canada, and the United States is estimated at 1,473,592,000 cwt., or 10·2 per cent. above the 1918 production, and 3 per cent. above the average yield of the years 1913–17.

THE flora of Aldabra and other small islands of the western Indian Ocean is the subject of an article by Dr. Hemsley in the Kew Bulletin (No. 3, 1919). Aldabra is an atoll, similar in size to the Isle of Wight, 220 miles north-west of Madagascar, and about 600 miles from the Seychelles Archipelago. Assumption, the nearest island, is about twenty miles distant. Aldabra is densely clothed with vegetation, which is unusually rich for an atoll flora, comprising herbaceous, shrubby, and arboreous species. Excluding species introduced by human agency, the flora comprises more than 170 species of flowering plants, representing 127 genera and 54 families, proportions which are characteristic generally of insular floras. Grasses number 14 species, Rubiaceæ 15, and Leguminosæ 12. The Rubiaceæ constitute the predominating element in the woody vegetation, both as to number and diversity of genera and number of species, but are less conspicuous in the scenery than the mangroves, the figs, and a species of Euphorbia. The vegetation consists of four types:—(1) Mangrove swamp, which fringes the lagoon. (2) Pemphis bush, a dense growth of the hard-wooded *Pemphis acidula* (Lythraceæ), a widely distributed sea-coast plant. (3) Open bush, mostly of low trees and bushes, which are usually leafless in the dry season and flower at the beginning of the rains; herbaceous plants are scarce, and only found in the wet season. Almost all the Aldabra plants are to be found in this type of country. (4) Shore zone, extending round the atoll, varying much in width and supporting some widely distributed littoral species. The coco-nut, of which there are conspicuous plantations, is regarded as an introduced plant. Dr. Hemsley is convinced that this palm is a native of South America, the home of all the numerous species of the genus, and that its present wide distribution is due to human agency. Some particulars are also given of the floras of other islands in the western Indian Ocean, and of their relations with the flora of Aldabra. The data collected point to the common origin of the flora of Aldabra and the neighbouring islands, and indicate that the flora is essentially African and almost without any infusion of a Malayan element, such as exists in the Seychelles and the Mascarene Islands.

October is a transition month so far as winds and distribution of atmospheric pressure are concerned in the East Indian Seas, and the Monthly Meteorological Chart published by the Meteorological Office shows that a considerable change is taking place in the general meteorological conditions. To the north of the equator northerly winds are decidedly asserting themselves and the south-west monsoon of the summer months is giving way. In the Bay of Bengal and in the Arabian Sea, October and November are the most stormy months of the year, and cyclones are more numerous than at any other period. The low barometric pressure which has prevailed over the land to the north of India is giving place to higher barometer readings, which causes a diametrically opposite wind circulation. The chart contains an interesting note of sea phosphorescence in the vicinity of Madras on July 3. At 2.10 a.m., in latitude 12° 43′ N., longitude 30° 34′ E., the steamship *Clan Ogilvy* (Capt. W. M. Porterfield) passed through what appeared to be a gigantic wheel, with many "curved" spokes, revolving the same way as the hands of a clock. The phenomenon lasted quite ten minutes, and is said to have been caused by phosphorescence. The wheel was travelling to the eastward. As each "spoke" passed, the ship was lit up.

That the war has done a great deal to show the value of the spectroscopic examination of metals and alloys is proved in an article on the subject in *La Nature* (September 6). Considerable information was gleaned regarding the composition of secret German alloys which were investigated by A. de Gramont by his method, and the same remark applies to the composition of the metal used by the enemy in the manufacture of the long-range shells fired upon Paris. The spectroscopic method would seem to be of particular value when applied to the examination of the constituents of alloy steels and commercial alloys, and, as the writer states, is capable of great expansion in this direction.

Messrs. Lever Bros., Ltd., Liverpool, have lately published an interesting "Cattle Food Calendar" for 1919–20. This contains articles on the scientific side of agriculture written by men competent to speak on their respective subjects. Further, it is illustrated by photographs and pictures of many of the important operations in agricultural science. Among the articles we note "How Mendelism May Help the Stockbreeder," and shorter, but equally interesting, articles on "The Work of the Board of Agriculture," "Plant Diseases," "The Relation between Skin-temperature and the Fattening Quality of Cattle," "The Official Seed-testing Station at the Food Production Department," "The Work of the Rothamsted Experimental Station," "The Breeding of New Wheats," "Warble Maggots in Cattle," "Investigation and Research in Dairying," "Contagious Abortion in Cattle," "Horticultural Research," "The Cheshunt Experimental and Research Station," and "Forestry." The list covers a wide field, and the articles give brief, but useful, summaries of the application of science to agriculture.

## OUR ASTRONOMICAL COLUMN.

Comet 1919*c*.—The following is a continuation of the ephemeris of comet 1919*c* (Metcalf-Borrelly) for Greenwich midnight:—

| | | R.A. | | | N. Decl. | | | | R.A. | | | S. Decl. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | h. | m. | s. | ° | ′ | | | h. | m. | s. | ° | ′ |
| Oct. | 9 | 15 | 38 | 25 | 5 | 11 | Oct. | 21 | 16 | 10 | 14 | 1 | 17 |
| | 13 | 15 | 48 | 38 | 3 | 4 | | 25 | 16 | 21 | 39 | 3 | 30 |
| | 17 | 15 | 59 | 14 | 0 | 54 | | 29 | 16 | 33 | 30 | 5 | 43 |

Log *r* and log Δ on October 9, 0·1574, 0·3052; on October 25, 0·1106, 0·2884. The comet is an evening object, and is getting inconveniently near the sun.

A Faint Nova.—Miss Mackie announces that she has discovered a nova from a study of the Harvard photographs (Harvard Bulletin 691). Its position is R.A. 20h. 3m. 4s., N. declination 17° 24·3′ (1900). It follows a 14th magnitude star by 0·2s. It reached its maximum, 7·2 magnitude, on November 22, 1913, and has now sunk to below 14·5. The position is in Sagitta, within the limits of the galaxy; it is only about 26° from Nova Aquilæ.

Hindu Spherical Astronomy.—Mr. G. R. Kaye has published a paper on "Ancient Hindu Spherical Astronomy" in the Journal and Proceedings of the Asiatic Society of Bengal (vol. xv.). In this he summarises, with the aid of modern mathematical formulæ, the fundamental portions of the principal classical astronomical texts, which date from between A.D. 498 (the *Aryabhatiya*) and about A.D. 1000, when the redaction of the *Surya Siddhanta* now extant was written. Indian trigonometry is, like Indian astronomy, of Greek origin, but the Indians developed the methods received from the Greeks in various ways. There seems to be no doubt that the Indians were the first to introduce the use of sines instead of chords, and to compute tables of sines. But they never went further, and did not make use of the tangent function. They never give a proof of any rule they enunciate. The title of Mr. Kaye's paper refers to spherical astronomy only, but the author also gives a short account of the Hindu notions of the motions of the planets, though this has been done by several previous writers. The Hindu planetary theories differ in several details from those of Ptolemy, and were probably mainly derived from Alexandrian writings from the period between Hipparchus and Ptolemy, now lost. Though there is nothing particularly new in Mr. Kaye's paper, it gives a convenient summary of the principal doctrines taught in the great Indian astronomical text-books.

Stellar Clusters.—Dr. and Mrs. Shapley contribute another paper to the *Astrophysical Journal* for July on stellar clusters. They give a table of forty-one clusters, of which thirty show ellipticity, eleven are sensibly circular, and one is unsymmetrical. The most elliptical cluster is Messier 19, in which the greatest diameter is about twice the least; this is a much lower degree of flattening than that in the galaxy or the spiral nebulæ. In the case of the circular clusters, the form may be real or it may be due to our being situated near their polar diameters. There is some evidence that clusters near the galactic plane tend to have their equatorial planes parallel to it. At a distance from the galactic plane this no longer holds.

## THE AURORA OF OCTOBER 1.

There was noteworthy auroral activity on the night of October 1. The display started in the early evening and lasted until well after midnight. As seen in the south of England, the aurora was generally of the glow type. The absence of streamers, etc., was commented on by Mr. W. H. Dines, of Benson Observatory, but Capt. J. E. Cowper noted streamers at Shanklin, Isle of Wight, soon after 22h. 15m.[1] The colour of the glow, which was comparable in effect with bright moonlight, was reported as "pale white" at Benson, "greenish-yellow" at

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[1] According to the *Times* of October 3 there was a brilliant display with streamers seen from Worcester Park about 1 30 on October 2. "Curtains" were seen at Newport between 21.30 and 23 on October 1.